TAX FOUNDATION

Overview of the Tax Foundation's General Equilibrium Model

February 2025 Update

The Tax Foundation uses and maintains a General Equilibrium Model to simulate the effects of government tax and spending policies on the economy and on government revenues and budgets. The model can produce both conventional and dynamic revenue estimates of tax policy. The model can also produce estimates of how policies impact macroeconomic aggregates such as gross domestic product (GDP), wages, employment, the capital stock, investment, consumption, saving, and the trade deficit. Lastly, it can produce estimates of how different tax policies impact the distribution of the federal tax burden. The model can analyze the effects of most types of taxes. It can estimate the effects of changes to the rate and the base of the individual income tax, the corporate income tax, payroll taxes, taxes on wealth like estate and gift taxes, and excise taxes.

The Tax Foundation model has three main components that work together to produce estimates. The first component is a tax simulator, which produces conventional revenue and distributional estimates as well as estimates of marginal tax rates on different sources of personal and business income. The second component is a neoclassical production function, which estimates long-run changes in the level of output based on changes in the capital stock and labor force in response to policy. The last component is an allocation model, which takes outputs from the tax and production models and combines with aggregate accounting identities and saving responses to forecast the different components of GDP, the balance between saving and investment, the international account, wealth, and gross national product (GNP).

The Tax Foundation model produces estimates of the long-run impact of tax policy as well as the year-by-year path of the economic adjustment and the impact of tax policy on the government budget over the usual 10-year budget window.

The Tax Foundation is the world's leading nonpartisan tax policy 501(c)(3) nonprofit.
For over 80 years, our mission has remained the same: to improve lives through tax policies that lead to greater economic growth and opportunity.
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1.0 The Tax Simulator

The starting point for Tax Foundation estimates is the output from the tax simulator. The tax simulator includes a detailed individual and corporate income tax and payroll tax calculator and models value-added taxes, excise taxes, the estate and gift tax, and miscellaneous taxes and fees. The tax simulator produces estimates of federal tax revenues, marginal and average tax rates, and the distribution of the tax burden over the long run and 10-year budget window.

1.1 The Individual Income Tax Calculator

The individual income tax calculator estimates individual income tax revenue changes and marginal tax rates on different sources of personal income by simulating most elements of the individual income tax. The current tax return simulator is coded in Python and includes more than 150 individual income tax parameters from 1954 to the present. The tax return simulator is sufficiently modular so that additional parameters can be created when needed.

The Public Use File

The main data source for the tax return simulator is the Internal Revenue Service's (IRS) 2011 Public Use File (PUF).[1] The PUF is a representative sample of US taxpayers, which contains more than 150,000 sample tax returns that represent the population of more than 150 million tax returns. Each record has information provided by taxpayers on IRS forms 1040, 1040A, 1040EZ, and supporting tax forms. Each sample tax return includes information on sources of income, such as wages and salaries, capital gains, interest, dividends, and business income. It includes information on deductions, exemptions, credits claimed, and any alternative minimum tax liability. It also includes information on filing status and number of dependents.

While the PUF has a vast amount of data, it comes with limitations, as it does not include information that is not reported on a 1040 or any of the supporting documents. The PUF does not include demographic information, such as the age of dependents, nor does it include detailed income splits between spouses. Additionally, the PUF usually takes the IRS several years to produce so the PUF for a given tax year is only available after a several-year lag. To address these issues, we extrapolate the PUF to future years and statistically match individual records to demographic information available from the US Census Bureau's Current Population Survey (CPS). We follow the extrapolation approach developed in TaxData[2], an open-source program to age microdata to future years. The imputation approach in TaxData was initially developed by John O'Hare[3].

TaxData takes a three-step approach. Step one grows all individual data elements on the base year file through the projection years to correspond to macroeconomic forecasts primarily from the Congressional Budget Office (CBO) economic outlook. Step two adjusts the sample weights to ensure the targeted variables sum to the aggregate targets using a linear programming algorithm. The sample weights are

1 NBER, "US Individual Income Tax Public Use Sample Documentation," http://users.nber.org/~taxsim/gdb/.
2 GitHub, https://github.com/PSLmodels/taxdata.
3 John O'Hare, "Extrapolation Methodology," June 15, 2009, GitHub, https://github.com/PSLmodels/taxdata/blob/master/docs/book/content/methods/Stage1_Stage2_Methodology.pdf

optimized to meet certain targets on return groups, aggregate income targets by income category, as well as the wage distribution across 12 wage groups. For non-wage income variables that do not have distribution targets in step two, step three applies an adjustment factor to each record to ensure the distribution of these variables is consistent with the base year data.

Our model also follows TaxData's approach to statistically match data from the CPS to the aged PUF. The CPS match imputes demographic information, such as age, gender, and income split within joint filers. The statistical match also imputes the records for non-filers, which facilitates modeling of certain tax proposals that affect filing behavior.

Tax Calculator Estimates

For baseline tax law and any given proposal, the tax calculator uses given tax policy parameters to estimate the tax burden for each sample taxpayer in the enhanced PUF, much like individuals would calculate their own tax liabilities. The calculator starts at the top of the IRS Form 1040 by summing adjusted gross income (AGI) for each sample taxpayer. Then it calculates taxable income by considering personal exemptions and deductions. After applying the marginal tax rates in the various tax brackets to taxable income, the tax calculator subtracts out credits and adds in alternative minimum tax to arrive at the final tax burden for each taxpayer.

The tax calculator accounts for certain taxpayer behavioral responses even for conventional estimates. The tax calculator assumes that taxpayers choose whether to claim the standard deduction or itemized deductions based on which provides a larger tax benefit. When estimating the cost of expanding credits such as the child tax credit and the earned income tax credit, we assume not all newly eligible taxpayers will claim the credits, just as not all filers who are currently eligible for the credits make use of them. We also account for the elasticity of taxable income with respect to statutory tax rates.

Lastly, we assume that taxpayers adjust their capital gains realization behavior when the marginal tax rates on capital gains changes. We use the same realization elasticities as the Joint Committee on Taxation (JCT). In the short run, the elasticity of realizations with respect to the marginal rate is -1.2 and in the long run it is -0.79.[4]

Effective Marginal Tax Rates

An important output of the tax return simulator is effective marginal tax rates (EMTRs). The EMTRs are used in the production model to estimate changes in the price of labor (the after-tax wage) and the price of capital (the after-tax return on capital). Marginal tax rates represent the additional tax owed on an additional dollar earned, which includes incremental changes in tax burdens due to changes in the statutory tax rate and in taxable income (the tax base), as when tax credits or deductions are changed, phased in, or phased out.

4 Tim Dowd, Robert McClelland, and Athiphat Muthitacharoen, "New Evidence on the Tax Elasticity of Capital Gains," Joint Committee on Taxation and Congressional Budget Office, June 2012, https://www.cbo.gov/sites/default/files/112th-congress-2011-2012/workingpaper/43334-taxelasticitycapgains.pdf.

The effective marginal tax rate ($EMTR$) is equal to the statutory tax rate (t_{sat}) faced by a taxpayer plus the marginal tax impact of any changes in the tax base. The marginal impact of tax base changes is calculated by multiplying the statutory tax rate (t_{sat}) by the change of the tax base ($\Delta\ Tax\ \ Base$) over the change in income ($\Delta\ Income$). Lastly, we add the marginal rate effects of credit phase-ins and phase-outs.

$$EMTR = t_{stat} + t_{stat}\frac{\Delta TaxBase}{\Delta Income} + \frac{\Delta Credit}{\Delta Income}$$

The tax return simulator estimates the effective marginal tax rate for each taxpayer for several sources of income: wages, capital gains, dividends, business income, and interest income. The sources of income fall into three categories used in the production model: labor income, corporate capital income, and non-corporate capital income.

Along with estimating marginal tax rates, the tax calculator estimates the effective average tax rate for each type of income. Average tax rates represent the total amount of individual income taxes paid on each source of income.

1.2 The Corporate Income Tax Model

Tax Foundation's corporate tax model calculates the federal tax liabilities of C corporations. At the core of the model, it computes the regular corporate income tax liabilities for a set of representative firms. The corporate tax model estimates the revenue implications of corporate tax policies over 10 years and in the long run.

There are four representative firm types in the corporate tax model. First, domestic corporations, which are US-owned and have no foreign operations. Second, US-headquartered multinational corporations (USHQMNEs). Third, foreign-owned US-headquartered multinationals (SMNEs). Fourth, foreign-controlled domestic corporations (FCDCs), which are owned by foreign corporations and do not own any foreign affiliates.

The model computes profit-shifting responses for each of these firm types if they have foreign affiliates (subsidiaries or parent companies). The model includes a component based on financial statement data to model the corporate alternative minimum tax and the stock buyback tax. It also has an independent module for section 965 transition tax.

Data Preparation

The model utilizes data from the Internal Revenue Service (IRS) and the Bureau of Economic Analysis (BEA). Data preparation starts with data on all C corporations operating in the United States from the IRS. This data is supplemented with BEA data on the parent companies of US multinational corporations and majority-owned US affiliates of foreign multinationals. (USHQMNEs and SMNEs).

IRS and BEA data provides relatively rich data on the controlled foreign corporations (CFCs) of US-headquartered and majority-owned foreign affiliates. This data allows us to produce representative CFCs across 74 industries and 48 countries.

This data allows us to compute profits before and after tax, Subpart F income, dividends to the US parent, qualified domestic top-up taxes on foreign income, foreign tax credits, and items related to global intangible low-taxed income (GILTI) calculations.

A key component of corporate as well as pass-through business taxation is the complex set of rules relating to capital cost recovery or depreciation, which dictate the schedule of deductions and credits associated with investments. The investment data comes from BEA's detailed data for fixed assets and consumer durable goods.

The model uses the current cost investment and net stock datasets, which provide the measures by detailed asset type and detailed industry, going back many decades. The model adjusts for S corporation data in the BEA definitions by calibrating a rescaling factor, as well as the bonus depreciation take-up rate. Each of these is calibrated based on IRS depreciation deductions by industry for C corporations for each year from 2007-2013.

Modeling the corporate alternative minimum tax (CAMT) and the stock buyback tax relies on microdata from financial statements of all corporations that file with the Securities and Exchange Commission (SEC), which provides balance sheet, income, and other data.

Tax Calculations

The model starts by estimating initial domestic taxable income, which is domestic earnings before interest, tax, depreciation, and amortization (EBITDA) less capital cost recovery deductions, plus taxable interest income, less interest paid, less state and local taxes, and less the domestic production deduction (for years prior to 2018). It includes several types of foreign income, including subpart F income, the GILTI inclusion, and foreign branch income.

Regular corporate tax liability is calculated as taxes before credits, less the foreign tax credit, less general business credits, and less the prior year minimum tax credit. General business credits include the R&D credit, the low-income housing tax credit, the orphan drug credit, the new markets credit, green energy credits, and other general business credits.

We calculate GILTI liability and foreign-derived intangible income (FDII) deductions, along with interest deductibility and indirect expense allocation. The income items for GILTI can be calculated on a country-by-country basis or pooled worldwide.

The model calculates the R&D credit using the amount of R&D, the statutory credit rates under the regular and alternative R&D credits, and the shares of R&D eligible for the credit, based on the IRS R&D credit tables. It also adjusts for the relative bias toward the alternative R&D credit, calibrated to match the IRS numbers by industry.

Modeling the Base Erosion and Anti-Abuse Tax (BEAT)

The main BEAT data comes from the IRS's international Tax Cuts and Jobs Act (TCJA) studies for 2018, which provides information on the total tax benefit and net BEAT liability for each industry. We can separate the data by different form types and split net BEAT liability by business form using their shares of the BEAT tax benefit.

We also conduct a mapping between industries using total corporate receipts and FCDC receipts. For the calibration, we compute adjusted regular tax liability under the baseline in 2018. We apply a heterogeneity adjustment and calibrate the dispersion parameter (one for each industry) to match the industry's BEAT liability for 2018. We use industry-level calculation to avoid error introduced in our firm-type split.

This approach allows us to model changes in the BEAT rate as well as the degree to which BEAT affects certain credits including for R&D. However, it does not allow us to model more granular details, such as the base erosion percentage threshold or what types of payments qualify as base erosion payments.

Modeling the Corporate Alternative Minimum Tax (CAMT) and Stock Buyback Tax

To model the CAMT and stock buyback tax, we use a panel dataset so we can capture intertemporal policy components like carryforwards of losses, excess foreign tax credits, and accumulated prior year minimum tax credits. We use the actual data for 2014-2022 and simulated "aged" data based on advancing data year-by-year beginning with 2023, estimating the growth process of relevant variables (jointly) and then simulating idiosyncratic firm dynamics for these variables.

We then use a regression to predict federal corporate income tax liabilities from financial statement data, using data from the rest of the corporate tax model to fill in any missing data between book and tax results. From there, we calculate CAMT liability and prior year minimum tax credits by computing adjusted financial statement income and CAMT foreign tax credits.

For stock buybacks, because they are volatile from year to year, we compute a seven-year average (relevant year, three previous years, three following years). Net buybacks are defined as purchases of common and preferred stock less the sales of common and preferred stock, and the tax base is any positive net buybacks. To account for interactions between the buyback tax and other corporate taxes, we estimate the marginal propensities of firms to repurchase stock, by regressing net buybacks on net income

Profit-Shifting Response

The corporate tax model allows us to model profit-shifting responses by multinational corporations. Profit-shifting responses are produced by taking the difference between the CFC effective tax rate and domestic adjusted statutory tax rates, applying a semi-elasticity for profit-shifting responses of 0.8 overall. Under an alternative set of assumptions, our model can also apply a semi-elasticity broken out for non-tax havens of 0.4 and 4 for tax havens as established by research conducted by Dowd, Landefeld, and Moore.[5]

5 Tim Dowd, Paul Landefeld, and Anne Moore, "Profit Shifting of US Multinationals," *Journal of Public Economics*, 148 (April 2017): 1-13, https://www.sciencedirect.com/science/article/abs/pii/S004727271730018X.

1.3 Depreciation Model

The depreciation model estimates annual depreciation deductions for both C corporations and pass-through businesses. It also produces estimates of the present discounted value of depreciation deductions, which are used in the production model as part of the determination of the cost of capital.

The core of the depreciation model is a detailed dataset of investment and the capital stock that we constructed from BEA and Federal Reserve data. This dataset contains the annual levels of investment and capital stock from 1954 to the present, and we have projected the series to 2028 in the corporate tax model.

The data is provided for more than one thousand types of capital that fall into four main asset types: equipment, nonresidential structures, residential structures, and intellectual property. Investment and the capital stock in these assets for each year are broken down by business form (C corporation versus pass-through) and by depreciation asset classes (three-year, five-year, etc.). This is done for every depreciation regime from 1954 to the present. The model is sufficiently modular that new depreciation proposals can be added when needed.

Using both investment and asset class weights, the depreciation model estimates the amount of depreciation deductions C corporation and pass-through businesses take on an annual basis. The model is set up to estimate both the steady-state value of depreciation deductions and depreciation deductions over the budget window, considering any transitions from one depreciation system to another. We use the latest CBO forecast to project the baseline growth of investment over the next two decades.

For pass-through businesses, changes in depreciation are converted into income factors, which are used to increase or decrease reported business income in the tax return simulator. The business income factors are equal to income minus depreciation in simulation over income minus depreciation in baseline.

For our economic modeling, the depreciation model also estimates the present-discounted value of depreciation allowances for each asset type for both C corporation and pass-through businesses. These values are used in the service price of capital in the production model to estimate changes in the size of the capital stock. For any given depreciation regime, we estimate the present discounted value of each depreciation schedule in both the baseline and in a simulation, using a discount rate of 5 percent, which represents the long-run real rate of return on capital of 3 percent plus an assumed inflation rate of 2 percent, which is the Federal Reserve's stated target.

These net present values are then weighed by the amount of the capital stock that falls into each asset class. The result is a weighted-average net present value for four assets: equipment, nonresidential structures, residential structures, and intellectual property.

Tax Foundation's depreciation model can estimate changes to depreciation regimes including cost recovery methods, asset lives, acceleration rates, bonus and expensing eligibility, investment tax credits, Section 179 expensing eligibility, and a proposed neutral cost recovery system.

1.4 Payroll Tax Model

The payroll tax model calculates the revenue effects of payroll taxes. It can model the impact of changes to the rate and base of the Social Security and Medicare payroll taxes, including self-employment taxes, and is flexible enough to model new payroll taxes. The payroll tax model is a component of the individual income tax calculator and uses the expanded PUF. Unlike the individual income tax, the Social Security and Medicare payroll taxes apply to everyone's earnings, which we model using the wage and salary splits for tax units in the expanded PUF.

The payroll tax model also estimates payroll tax impacts on effective marginal tax rates (EMTRs) on labor earnings and certain forms of pass-through business income. The EMTR for each tax unit is the weighted average of each earner's marginal tax rate weighted by their respective labor and net business income.

Consistent with conventional scoring, we assume nominal GNP is fixed and that total compensation (including nontaxable benefits) is unchanged by payroll tax changes. This means that any increase in employer payroll taxes will result in a decrease in employee wages and benefits. This decrease in wages and benefits will lead to a reduction in the individual income and employee-side payroll tax base.[6]

1.5 Value-added Tax

The value-added tax (VAT) model allows us to model proposals to introduce VATs and other broad-based excise taxes. Given no such tax currently exists in the US federal tax system, we use outside data to estimate what a VAT in the United States would look like.

Estimates of the value-added tax start with construction of the tax base. We treat the value-added tax like a factor income tax or a subtraction-method value-added tax. The tax base is made up of three factors: labor income, corporate and noncorporate capital income (less investment, which is deductible under VAT), and net imports. We derive the data from BEA and Federal Reserve figures.

Simply multiplying the VAT rate by the proper economic accounts would overstate the potential revenue impact of a value-added tax. First, any tax will suffer from some tax avoidance. As such, we reduce the value-added tax base to account for potential tax avoidance. We assume that the value-added tax noncompliance rate would be 15 percent, which is what the US Treasury assumed in its estimate of a US value-added tax.[7] Overall, we estimate the initial value-added tax base, before any exemptions, is about 72 percent of GDP.

Exclusions to the value-added tax base are modeled by reducing the tax base by the estimated size of the exclusion.

6 Joint Committee on Taxation, "The Income and Payroll Tax Offset To Changes in Payroll Tax Revenues," Nov. 18, 2016, https://www.jct.gov/publications/2016/jcx-89-16/.

7 Report of the President's Advisory Panel on Federal Tax Reform, "Simple, Fair, and Pro-Growth: Proposals to Fix America's Tax System," November 2005, https://home.treasury.gov/system/files/131/Report-Fix-Tax-System-2005.pdf.

Table 1. Value-added Tax Base (Billions of Dollars, 2022)

Compensation of Employees	$12,538
Net Capital Income (Profits + Interest + Consumption of Fixed Capital + Excise Taxes - Investment)	$6,181
Net Imports	$862
Housing Adjustment to Prepay Tax on Owner-Occupied Housing (Household Investment Less Household Gross Capital Income)	-$347
Noncompliance (15% rate)	-$2,472
Broad VAT Base (Before Exemptions)	$16,761
Broad VAT Base (% of GDP)	72%

Note: The broad base includes a housing adjustment to tax owner-occupied housing consumption on a prepay basis, adjusting the point at which owner-occupied housing is taxed. The adjustment removes imputed rental income from owner-occupied housing from the base and adds new housing investment. See discussion in Satya Poddar, "Taxation of housing under a VAT," Tax Law Review (Aug. 31, 2010), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1669559.

Source: BEA Tables 6.7, 1.1.5, 1.13, 7.5, and 2.4.5, Tax Foundation calculations

We estimate projected tax revenue by taking the projected value-added tax base and multiplying it by the tax inclusive VAT rate. The tax inclusive rate for a VAT is equal to the tax exclusive rate divided by one plus the tax exclusive rate.

$$VATRate_{inc} = \frac{VATRate_{Excl}}{1+VATRate_{Excl}}$$

When a value-added tax is enacted, it creates an offsetting revenue loss for the individual income tax, the corporate income tax, and payroll tax. This is because the value-added tax is an indirect tax collected from sales before payments to factor inputs. In other words, it reduces the post-VAT revenues to businesses that are used to compensate labor and owners of capital.

To model the revenue offsets, we create income factors, which are used in the individual income tax model, corporate tax model, and payroll tax model to shrink factor income by the amount of the value-added tax. The value-added tax income factors for the three factor incomes (labor income, corporate income, and noncorporate income) are calculated by dividing post-tax factor income by pretax factor income.

$$VATIncomeFactor = \frac{FactorIncome - VAT}{FactorIncome}$$

In modeling the distributional impact of the value-added tax, we follow the modeling convention that prices remain constant, and the tax is "passed back" to the factors of production by reducing labor and capital income.[8] The aggregate VAT revenue change from the VAT module is distributed to each tax filer based on their share of the VAT base, which includes both labor income and net capital income.

To estimate the economic impact of the value-added tax, we treat the value-added tax as a tax wedge on labor, which reduces labor supply and economic output. The marginal VAT rate is equal to the tax inclusive value-added tax rate reduced by any noncompliance and exemptions.

8 Eric Toder, Jim Nunns, and Joseph Rosenberg, "Using a VAT to Reform the Income Tax," Tax Policy Center, Jan. 27, 2012, http://www.taxpolicycenter.org/sites/default/files/alfresco/publication-pdfs/412489-Using-a-VAT-to-Reform-the-Income-Tax.PDF.

1.6 Estate and Gift Tax

We use a side-model to estimate changes to the estate tax, treating the estate tax as a tax on wealth. The estate tax model is based on 2007 data on estates from the US Treasury that have been extrapolated to match the current year economy. The dataset contains information on the size of estates and their estate tax liability. The estate tax model can estimate both the impact of changes in the estate tax rate and changes in the estate tax exemption amount.

The estate tax model produces two outputs. First is the effective tax rate, which is the total estate tax revenue as a percent of wealth. The model uses the effective tax rate to gross up or down CBO projections of estate tax collections as wealth rises or falls in response to policy changes. Second is the ratio of the marginal tax rate to the average tax rate on estates owing some tax, which may be changed either by alterations in the statutory rates or the exempt amounts. The resulting marginal tax (ratio times the average rate on wealth) is modeled as increasing the required return on saving.

1.7 Other Taxes

Excise Taxes, Tariffs, and Miscellaneous Taxes

The Tax Foundation model estimates the impact of excise taxes, tariffs, and miscellaneous taxes on revenue and economic output. Baseline excise and miscellaneous taxes are expressed as marginal tax wedges on labor and capital income that are equal to tax revenue over private business output.

Changes to excises, tariffs, and miscellaneous taxes are all estimated off-model using supplementary data. In the case of tariffs, we estimate the tax base using detailed trade data by product code from the US International Trade Commission and adjust the base to account for estimates of the elasticity of imports. Similar to the Joint Committee on Taxation[9] we model tariffs and other excise taxes as creating revenue offsets for the individual income, corporate income, and payroll taxes, because they are indirect taxes on sales, taken by the government out of business revenue before it is distributed as compensation to the factor inputs.

We model the tax base offsets using the same procedure as for the value-added tax. That is, we use income factors to shrink or increase factor incomes by the projected tax change. Income factors are also used to distribute the excise and miscellaneous taxes as reductions or increases in labor and capital income in the individual income tax calculator. As with value-added taxes, excises and similar taxes are modeled as a tax wedge on labor, which reduces labor supply and economic output.

9 Joint Committee on Taxation, "New Income and Payroll Tax Offset to Changes in Excise Tax Revenues For 2018-2028," Mar. 27, 2018, https://www.jct.gov/publications.html?func=startdown&id=5066.

State and Local Taxes

The Tax Foundation model accounts for state excise taxes, state and local income taxes, sales taxes, property taxes, estate and gift taxes, and state corporate income taxes. State and local taxes serve two functions in the model. First, they allow us to model the interaction among federal and state and local tax policy in determining taxable income. For example, the effective marginal state and local income and sales tax rate influences the impact the state and local tax deduction has on federal effective marginal tax rates. Second, estimating state and local taxes allows us to fully account for the tax burden on individuals and businesses. Excluding state and local taxes would understate baseline marginal tax rates, overstate baseline after-tax returns to labor and capital, and understate the economic impact of federal tax changes.

The method by which we estimate state and local taxes differs depending on the tax. For state and local income taxes, we use the individual income tax calculator. For simplicity, we assume that state and local taxes have the same tax base as the federal tax code and that state tax bases remain unchanged when the federal tax base changes. We assume that each taxpayer faces a state tax rate that is equal to his or her marginal federal tax bracket rate times the ratio of state income tax revenue over federal individual income tax revenue.

For corporate taxes and estate taxes, we assume that the weighted average state tax rate is equal to the federal rate times the ratio of state corporate tax revenue over federal corporate tax revenue.

The remaining state taxes (state and local sales taxes, personal property taxes, real estate and other property taxes, payroll taxes, and miscellaneous state taxes) are modeled the same way as federal excise and miscellaneous taxes. They are treated as either tax wedges on labor or capital, and the rates are equal to revenue divided by the appropriate tax base, usually private business output or the capital stock.

1.8 Miscellaneous Tax Expenditures and Policy Proposals

Every year, the federal government forgoes more than $1 trillion in revenue due to various credits, deductions, and income exclusions. Many tax expenditures are deductions and credits that are directly reported on an individual's tax return and can be estimated directly in the individual income tax calculator. However, other tax expenditures are income exclusions and are not reported to the IRS on tax returns, or are business expenditures, for which we lack micro data. To estimate the impact of such tax expenditures, we use supplementary data.

The method by which we estimate specific tax expenditures depends on the type of tax expenditure and the available data. For individual income exclusions, we use outside data to impute changes in reported AGI and taxable income in the individual income tax calculator. For personal tax expenditures with little available data and for business tax expenditures, we take revenue estimates directly from either the Joint Committee on Taxation[10] or the US Treasury.[11] In simulations in which individual and business income tax rates change, we adjust the size of certain tax expenditures by the ratio of the new tax rate over the old tax rate. In dynamic analyses, we assume that the value of tax expenditures grows with the size of GDP.

10 Joint Committee on Taxation, "Publications on Tax Expenditures," https://www.jct.gov/publications/?category_name=Tax%20Expenditures.
11 US Department of the Treasury, "Tax Expenditures," https://home.treasury.gov/policy-issues/tax-policy/tax-expenditures.

To capture the economic effect of tax expenditures, we first separate expenditures into two groups: expenditures that fall on the margin of economic activity, which impact a taxpayer's incentive to work or invest, and expenditures that do not. For example, Section 199 under previous law provided a deduction for income from domestic manufacturing. It acted like a reduced marginal tax rate for certain businesses and had an impact on incentives to earn additional income.

The tax revenue from tax expenditures that impact incentives to work or invest is transformed into marginal tax rate equivalents, which are used in the production model as either tax wedges on labor or capital income. The marginal tax rates are equal to the ratio of the expenditure's revenue over baseline revenue times the labor or capital marginal tax rate.

We follow the same process of using outside, supplementary data when estimating the impact of new policy proposals that go beyond the structure of the current tax code.

1.9 Distributional Tables

Measuring Income

In the previous versions of the model, we used Adjusted Gross Income (AGI) as our definition of pretax income for distributional analysis. However, because AGI is an incomplete measure of the economic well-being of tax filers, in February 2025 we began using an expanded definition of income, called market income, as the income classifier in our distributional tables.

Market income includes AGI plus: 1) tax-exempt interest; 2) nontaxable Social Security income; 3) the employer share of payroll taxes; 4) imputed corporate tax liability; 5) employer-sponsored health insurance and other fringe benefits; and 6) taxpayers' imputed contributions to defined-contribution pension plans.

Measuring the Distributional Impact of Tax Changes by Income Group

The Tax Foundation model produces distributional analyses of tax policies on both a conventional and dynamic basis. Both tables measure the distributional impact of tax proposals as percentage changes in after-tax income, or the amount of income taxpayers have available to consume after taxes. However, the tables are constructed in slightly different ways.

The units of analysis for Tax Foundation distributional tables are individual income tax returns. After-tax income is measured as market income less: individual income tax liability net of refundable credits; payroll tax; corporate income tax; estate and gift tax; VAT; customs duties, tariffs, and excise taxes. The distributional tables show, for a given tax change, the percentage change in after-income across various income groups.

In general, Tax Foundation distributional tables group tax returns into five buckets or quintiles, with each quintile (0%-20%, 20%-40%, 40%-60%, 60%-80%, and 80%-100%) containing an equal number of tax returns that are ordered by market income, excluding tax returns with negative market income and non-filers (these are included in the totals).

Before tax returns are ordered, however, each return's market income is adjusted to account for the size of the household by dividing market income by the square root of the number of exemptions. In addition to the five quintiles, we break down high-income tax returns into four smaller buckets (80%-90%, 90%-95%, 95%-99%, and 99%-100%). This is because the distribution of income is unequal and a significant amount of total income is reported, and a significant amount of tax is paid, by high-income taxpayers.

Table 2. Quintile Break Points for Market Income, 2024

0%-20%	0 - $16,319
20%-40%	$16,319 -$35,671
40%-60%	$35,671 - $67,590
60%-80%	$67,590 - $118,883
80%-100%	>$118,883
80%-90%	$118,883 - $171,970
90%-95%	$171,970 - $242,854
95%-99%	$242,854 -$557,732
99%-100%	>$557,732

Note:
1) Market income levels are adjusted for the number of exemptions reported on each return.
2) Tax units with negative market income and non-filers are excluded from the income groups but included in the totals.
Source: Tax Foundation General Equilibrium Model.

Conventional Estimates: Long-run and 10-year Analysis

Our conventional (static) distributional analysis estimates the long run as well as the annual change in the distribution of the tax burden. Our conventional tables include all federal taxes: incomes taxes (corporate and individual), payroll taxes, excise taxes, tariffs, miscellaneous taxes and fees, and the estate and gift tax.

In general, our conventional tables follow modeling conventions used by other groups (Joint Committee on Taxation,[12] the US Treasury,[13] and the Congressional Budget Office[14]). The size of the economy is assumed to be held constant. The individual income tax is borne entirely by the individuals who pay them. Payroll taxes (both employer and employee-side) are fully borne by workers. The value-added tax and excise taxes are passed back to factors of production (capital and labor) in the form of lower income. The corporate tax is borne by both capital and labor, with most of the burden falling on capital initially and in the long run falling evenly on capital and labor.[15]

12 Joint Committee on Taxation, "Methodology and Issues in Measuring Changes in the Distribution of Tax Burdens," June 14, 1993, https://www.jct.gov/publications.html?func=startdown&id=4471.

13 Julie-Anne Cronin, "U.S. Treasury Distributional Analysis Methodology," US Department of the Treasury, May 2022, https://home.treasury.gov/system/files/131/TP-8.pdf.

14 Congressional Budget Office, "The Distribution of Household Income in 2021," Sept. 11, 2024, https://www.cbo.gov/publication/60341 .

15 We derive our corporate tax distribution by following a similar methodology used by the US Treasury. Under the Treasury approach, the corporate tax is split into two parts: a tax that falls on the normal returns to investment, which ends up falling on labor and capital through reduced output, and a tax that falls on supernormal returns, or rents, which is a tax fully borne by shareholders. See Julie-Anne Cronin, Emily Y. Lin, Laura Power, and Michael Cooper, "Distributing the Corporate Income Tax: Revised U.S. Treasury Methodology," US Department of the Treasury, May 2012, https://www.wsj.com/public/resources/documents/May2012corptax-paper.pdf. We believe the calculation of supernormal returns is overstated in the Treasury work and choose a split with more of the tax borne by labor. For more, see Stephen J. Entin, "Labor Bears Much of the Cost of the Corporate Tax," Tax Foundation, Oct. 24, 2017, https://taxfoundation.org/labor-bears-corporate-tax/.

Consistent with US Treasury, our long-run conventional analysis distributes the long-run burden of a tax change rather than changes in tax liabilities on an annual basis.[16] As such, we focus on the tax burden of the law when it is fully phased in, ignoring phase-ins and phaseouts of provisions that may occur over the budget window. We also ignore transitory revenue impacts.

For example, changes in depreciation schedules can create temporary, large changes in corporate tax revenue, which disappear in later years. Our model ignores these short-run changes in the timing of deductions and focuses on the long-run change in the burden of the corporate tax caused by the increased or decreased present value of corporate tax deductions.

In our 10-year distributional analysis, we distribute the impact of taxes on a cash basis. As such we include the effects of phase-ins and phaseouts of provisions and economic effects that occur over the standard 10-year budget window. The result is a series of distributional tables that capture the annual change in after-tax income for taxpayers each year over the next 10 years.

Dynamic Estimates: Long-run and 10-year Analysis

Our dynamic distributional analysis also estimates the long-run change in after-tax incomes, but it includes the impact of changes in the size of the economy due to tax policy. As such, we distribute both the change in tax liabilities to taxpayers plus any changes in income that arise from a change in economic output. Our long-run dynamic analysis uses the same assumptions as our long-run conventional analysis for most taxes: the individual income tax, the payroll tax, the value-added tax, and excise taxes.

To distribute the corporate income tax on a dynamic and long-run basis, we distribute the portion of corporate tax (50 percent) that we assume falls on supernormal returns to taxpayers in proportion to their reported capital gains and dividend income, the same as the capital share in the long-run conventional estimate. However, our long-run dynamic distributional analysis does not distribute the tax on normal returns directly to taxpayers with wage income. Rather, to the extent the corporate tax falls on normal returns, it impacts the incentive to invest and, thus, has an impact on the capital stock, worker productivity, and wages. This impact of the corporate tax is accounted for within the dynamic model when we adjust taxpayer incomes to reflect changes in output.

Economic changes from the production model are distributed to taxpayers through income growth factors. The production model produces income factors for five income categories: labor income, corporate capital income, noncorporate capital income, interest income, and other income. The labor income, corporate capital income, and noncorporate capital income growth factors are equal to their respective simulation values divided by their baseline values. The interest income and other income growth factors are equal to simulation GDP over baseline GDP. These five growth factors are matched with income and tax items in the expanded PUF.

16 Julie-Anne Cronin, "U.S. Treasury Distributional Analysis Methodology."

Table 3. Growth Factors and Associated Income in the Expanded Public Use File

Growth Factor	Growth Factor Calculation	Scaled Income and Tax Items
Labor Income	Percent change in labor compensation	Wages and salaries, self-employment income, state and local taxes, and other imputed labor income
Corporate Capital Income	Percent change in corporate capital income (net of depreciation)	Ordinary dividends, qualified dividends, short-term capital gains, long-term capital gains, capital losses, capital gains distributions, and other capital gains
Noncorporate Capital Income	Percent change in noncorporate capital income (net of depreciation)	Schedule C, E, F income, rent and royalty income, businesses' losses, partnership and S corporation income
Interest Income	Percent change in GDP	Taxable interest, tax-exempt interest, investment interest expense, and deductions for interest paid
Other Income	Percent change in GDP	Taxable refunds, credits, offsets of state and local income taxes, alimony received, other income on schedule E, miscellaneous income, Social Security received, IRA distributions, taxable pension and annuity income, unemployment compensation

Source: Tax Foundation General Equilibrium Model.

Table 4. Main Tax Model Baseline Parameters, 2024

Federal Individual Income Tax	
Wages	19.0%
Dividends	10.7%
Interest Income	26.1%
Business Income	22.3%
Capital Gains	6.2%
State and Local Income Tax	
Wages	4.5%
Dividends	3.9%
Interest Income	7.6%
Business Income	6.6%
Capital Gains	2.1%
Payroll Tax	
Federal	8.7%
State and Local	0.2%
Corporate Income Tax	
Federal	21%
State and Local	2.3%
Present-Discounted Value of Depreciation Deductions	
Corporate	
Equipment	91%
Nonresidential Structures	64%
Intellectual Property	96%
Residential Structures	55%
Noncorporate	
Equipment	94%
Nonresidential Structures	58%
Intellectual Property	97%
Residential Structures	56%
Estate Tax	
Federal	0.03%
State and Local	0.01%
Excise and Other Taxes	
Personal Property taxes	0.1%
Other Taxes	0.4%
Federal Excise Taxes	0.6%
Customs Duties	0.5%
State and Local Sales Taxes	2.8%
Other State and Local Excise Taxes	2.0%
Real Estate Property Tax on Homeowners	0.7%
Real Estate Property Tax on Corporations	1.1%
Real Estate Property Tax on Noncorporate Businesses	1.1%
Subsidies for Business	-0.4%
Subsidies for Homeowners	-0.0%

Note: All values are marginal tax rates except for the present-discounted value of depreciation deductions.
Source: Tax Foundation General Equilibrium Model.

2.0 Production Model

The production model uses marginal tax rates calculated by the tax model to estimate changes in long-run output. The estimate of economic output includes GDP, compensation of employees, the labor supply (in hours worked), and the capital stock. The outputs of the production model are also used to produce income growth factors, which are used in the tax model to produce both dynamic revenue and distributional estimates. Lastly, outputs from the production model are used in the allocation model to estimate changes in consumption, investment, and the trade balance.

The production model is constructed by separating the economy into four production sectors: private business, households and institutions, government enterprises, and general government. This division aligns output according to how products are distributed and how the income generated is taxed. Private businesses produce the largest share of output. Institutions and households do not sell their products in the market, but produce goods and services such as housekeeping, gardening, home health care, imputed rent on owner-occupied housing, and the output of nonprofit organizations. Government enterprises, unlike general government, do sell their products in the market. General government output is measured at cost, which is the compensation of government workers and government consumption of fixed capital.

All four sectors have employees that pay taxes through the individual income tax and the payroll tax. We divide the private business sector into the corporate sector and the noncorporate sector due to their different tax statuses. The corporate sector is subject to two layers of taxation: one at the entity level when the corporation earns income, and a second layer at the individual level when that income is passed to its shareholders as dividends or capital gains. The noncorporate sector includes S corporations, partnerships, and sole proprietors. Their income is passed through to individuals and only taxed once at the individual level.

The household and institutions sectors are not taxed overall and can be split into homeowner-occupied housing and nonprofit institutions serving households. The homeowner-occupied housing sector is unique as a legal form with investment incentives such as the deductions for home mortgage interest and property taxes.

The production model employs four underlying assumptions:

1. The real after-tax rate of return on physical and intangible capital is constant in the long run. This means that when effective marginal tax rates decline and push the after-tax return up, businesses will invest more and increase the size of the capital stock until the after-tax rate of return is driven back to its original level. Likewise, if effective marginal tax rates increase, investment will decline, and the capital stock will shrink until the after-tax rate of return rises back to its original level.

2. Labor's share of factor income is assumed to be constant in the long run. We also assume that shares of market GDP by sector are constant.

3. The supply of labor is somewhat inelastic. In modeling the response of workers to changes in their after-tax wage, we assume a weighted average labor supply elasticity of about 0.3, which can be broken out to account for differences in labor responses by income group. This approach is well-supported in the economic literature and falls in the middle of the range of estimates, including those used by CBO.[17]

4. We assume that the Federal Reserve holds the price level constant. This allows us to focus on the effect of tax policy rather than some combination of a tax policy change with an accompanying monetary policy change that shifts the price level.

2.1 Cobb-Douglas Production Function

The production model is based on a Cobb-Douglas production function with constant returns to scale. Each non-general government sector mentioned above has its own production function. The production function uses labor and capital as inputs and assumes the change in output is proportional to the changes in the input. This construction provides us estimates for output and the compensation of capital and labor for each sector.

The production function for the non-general government sectors can be formulated as follows,

$$Y = F(K, L) = A * K^{a} * L^{(1-a)}$$

where A is the total factor productivity coefficient;

K is capital input, in dollars;

l is labor input, in hours;

a is the output elasticity of capital; and

$(1 - a)$ is the output elasticity of labor.

An economy in perfect competition seeks to maximize its profit for each sector. Based on the first-order condition for maximum profits, given the price level for each sector, we estimate the parameters for output elasticity and distribute factor income from labor and capital in fixed ratios for different sectors.

2.2 Service Price of Capital

To simulate changes in private investment, we estimate the service price for C corporations, pass-through businesses, and homeowner-occupied housing. The service price of capital[18] is the expected gross return that an investment must attain to cover all taxes, economic depreciation, and the opportunity cost of

17 Congressional Budget Office, "How the Supply of Labor Responds to Changes in Fiscal Policy," Oct. 25, 2012, http://www.cbo.gov/sites/default/files/cbofiles/attachments/10-25-2012-Labor_Supply_and_Fiscal_Policy.pdf.

18 Dale Jorgenson, "Capital Theory and Investment Behavior," *American Economic Review* 53:2 (1963), https://scholar.harvard.edu/jorgenson/publications/capital-theory-and-investment-behavior.

lenders and savers. It is also known as the user cost of capital[19]. Each sector has a different service price because the composition of the capital stock and tax regimes vary by sector. The service price for three main private sectors (corporate, noncorporate, and homeowner-occupied housing) are discussed below.

The construction of the service price starts from understanding the firm's discount rate. The discount rate is widely used by firms to calculate an investment's cash flow. A firm's new investments are usually financed with a mix of debt and equity. The discount rate for the firm is calculated as the weighted average cost for equity financing and debt financing. The discount rate for equity financing is the required nominal real after-tax rate of return on equity. The discount rate for debt financing is determined by the real interest rate and inflation. In addition, the cost of debt financing, interest expense, is partially tax-deductible. The nominal discount rate for a firm can be specified as in Equation (1).

$$r = f*[i*(1-\rho_d*t)] + (1-f)*E \quad (1)$$

where f is the fraction of the investment financed by debt;

i is the nominal market interest rate;

t is the marginal tax rate at the business entity level for the corporate and noncorporate sectors; for the homeowner-occupied housing sector, it is the weighted average marginal tax rate applicable to the mortgage interest paid deduction;

ρ_d is the deductible share of net interest paid; and

E is the required nominal after-tax rate of return on equity-financed investment.

The overall service price of capital is calculated by grossing up the real discount rate (plus economic depreciation) to account for any taxes at the entity level with adjustment due to tax deductions and credits. The general service price for C corporations, pass-through business, and homeowner-occupied housing takes the following form:

$$s = \frac{(r+\delta-\pi)*(1-t*z)}{(1-t)} + t_p \quad (2)$$

where r is the nominal discount rate;

π is the inflation rate;

δ is the rate of economic depreciation;

t is the combined income tax rate at the federal and state level after considering the deductibility of state tax against federal tax;

19 "Service price" usually includes all costs, including economic depreciation. The term "user cost of capital" usually includes all costs other than economic depreciation.

z is the combined net present value of cost recovery at the federal and state level; and

t_p is the property tax rate; for the homeowner-occupied housing sector, t_p is adjusted down by the marginal tax rate for the property tax paid deduction calculated from the tax simulator.

For the homeowner-occupied housing sector, the imputed rents are not taxable, and homeowners cannot claim depreciation deductions, so the service price simplifies to:

$$s = r + \delta - \pi + t_p$$

The government enterprises and nonprofit institutions are largely exempt from most taxes, so the minimal required service price is the sum of the long-term after-tax return r and economic depreciation, which can be written as $s_g = r + \delta$.

2.3 Capital Income Savers' After-tax Rate of Return

Like business entities, individual investors consider their after-tax rate of return when making investment and saving decisions.

For capital income earners from the corporate sector, the profits of corporate investments, first taxed at the entity level, are generally taxed again when paid out to individuals. This introduces a second layer of taxation on corporate profits. An individual investor needs to consider whether the investment will return enough to pay them the same rate of return that they would obtain otherwise.

Following the CBO's[20] specification of the after-tax rate of return at the individual level, we compute the savers' returns as a weighted average of two financing sources, namely debt-financed and equity-financed investments. If investments are funded through issuing stock or from the reinvestment of existing profits, a competitive rate of return must be expected by investors on this equity income to pay tax on capital gains (when corporate stocks are sold) and dividends (when corporate profits are distributed as dividends).

If the corporation obtains its funds through borrowing or issuing bonds, the savers (the source of the corporate investment's funding) must get enough return to cover the market interest rate and the tax on interest income at the individual level. The real after-tax rate of return for savers is computed as a weighted average rate of return for these two investment approaches.

20 Congressional Budget Office, "Taxing Capital Income: Effective Marginal Tax Rates Under 2014 Law and Selected Policy Options," Dec. 18, 2014, https://www.cbo.gov/publication/49817.

In addition, individual investors face estate tax on their assets when they transfer wealth to heirs at death. Thus, the estate tax changes the investment incentive of an individual since it limits the amount of wealth that can be passed down to the heirs or any chosen social cause. So, the rate of return for savers funding corporate firms is specified as follows:

$$S = f*[i*(1-\rho_i*t_i)] + (1-f)*E*(1-\rho_e*t_e) - t_{es} - \pi$$

f where is the fraction of the investment financed by debt;

i is the nominal interest rate;

π is the inflation rate;

t_i is the marginal tax rate on individual interest income, which depends on the investor's tax brackets;

E is the required nominal after-tax return on equity investment;

t_e is the marginal individual tax rate on the return on equity income (long-term capital gains and dividends). For equity-financed investments in pass-through businesses and homeowner occupied housing, the tax on capital gains and dividends is zero $(t_e = 0)$;

t_{es} is the marginal tax rate for federal estate and gift tax;

ρ_i is the share of interest income subject to individual income tax; and

ρ_e is the share of long-term capital gains and dividends subject to individual income tax. This share will adjust based on what proportion of equity income is deposited in a tax-deferred saving vehicle (such as tax-deferred annuities and traditional IRA accounts), or nontaxable savings accounts (such as health savings accounts) or stepped up to its fair market value when transferred from a decedent to an heir at the time of death and becomes tax-free.

2.4 Labor Supply Function

The price of leisure is the after-tax wage forgone by not working. We assume that people choose between leisure and work based on the real after-tax wage. The labor supply is therefore determined by the real after-tax wage rate and the wage elasticity of the labor supply. The model assumes one homogeneous labor pool for all sectors, with the same wage and supply responses across the economy. All sectors have an equal before-tax wage rate, indicated as in the production function for each sector. As stated previously, the assumed elasticity of labor supply in this model is 0.3, which means that a 10 percent increase in real after-tax compensation gives rise to a 3 percent increase in hours worked. The labor supply function can be formulated as

$$\ln L = \ln a + \beta * \ln\left(w * \left(1 - t_l\right)\right)$$

where a is a calibration constant;

β is the elasticity of labor supply;

and t_l is the marginal tax rate on labor income across all sectors, which is calculated from the tax simulator.

The production model assumes that the hours of labor input in the government sector and government consumption of fixed capital are exogenous. It assumes that government workers are paid the same wage as workers in the non-government sector. Changes in wages in the nongovernment sector affect total labor compensation for government employees, which defines the contribution of the general government sector to GDP.

2.5 Growth Factors

As policy changes alter service prices and tax rates, the production function generates the new level of production in the economy. The new level of output grows or shrinks various tax bases, such as capital income, wage income, and other income. The percentage shift in these tax bases provides income growth factors for various types of income, as described in section 1.9, which interact with the tax simulators to scale up or down the individual income items for each tax filer. Thus, tax filers are moved to new tax brackets and the weighted-average marginal tax rate for labor income changes accordingly. The marginal rate changes for labor income cause further changes in the supply of labor and generate a new level of output in the economy, at which taxes and tax rates are recalculated.

3.0 Allocation Model

The allocation model attempts to forecast and report on more features of the economy than a simple production model. It takes outputs from the tax and production models and combines these with aggregate accounting identities and saving responses to forecast the different components of GDP, the international account, savings and investment, and GNP and wealth, consistent with the assumptions used in the production model regarding the responsiveness of domestic saving and the degree of openness of the US economy.

GNP is defined as GDP plus income receipts from the rest of the world less income paid to the rest of the world:

$$GNP = GDP + \pi_d - \pi_f$$

Income received from the rest of the world π_d comes from US claims on foreign assets F_d. We pay income π_f to the rest of the world based on foreign claims on US assets F_f.

The allocation model relies on a simplifying assumption: private domestic agents save a share of GNP, where this saving rate has an elasticity of 0.4 with respect to the after-tax rate of return to savers.[21]

We gross private saving to update wealth, based on the historical relationship between these aggregate variables. We use this new value of wealth to compute foreign claims on US assets. Wealth consists of the domestic capital stock and net financial wealth, which equals government debt outstanding and US claims on foreign assets less foreign claims on US assets. Thus,

$$F_f = K + D + F_d - W$$

For this equation, the capital stock K comes from the production model, government debt D comes from the tax model, and we assume US claims on foreign assets F_d do not change from the baseline.

We next calculate the income received from and paid to the rest of the world. Like the total US claims on foreign assets, we assume income received from these foreign assets does not change from the baseline. Income paid to the rest of the world consists of income paid on their baseline claims on US assets F_f^0, income paid on their new claims $F_f - F_f^0$, and payments not attributable to investment. Note that the rates of return on these existing and new assets may differ. Under the current baseline, Treasury bonds represent a large share of this portfolio of these existing foreign claims, whereas the change in these claims includes investment in the US corporate sector. We assume changes in wealth attributable to changes in the after-tax rate of return for domestic savers result in changes in foreign claims on corporate assets. We assume changes in debt result in changes in foreign claims on debt. Accordingly, we update the rate of return on foreign claims on US assets to reflect the new composition of the foreign investor's portfolio.

Finally, we use these payments to the rest of the world to recalculate the long-run value of GNP.

21 Simple, fair, and pro-growth: Proposals to fix America's tax system," US Government Printing Office, 2005, 224-225, https://govinfo.library.unt.edu/taxreformpanel/final-report/.

4.0 Producing Estimates

The three main components of the Tax Foundation General Equilibrium Tax Model work iteratively to produce revenue and economic estimates. The Tax Foundation model can produce two types of estimates: comparative statics, or long-run estimates, and estimates over a 10-year budget window.

4.1 Comparative Statics

The comparative statics model estimates the long-run impact of tax policy by comparing a baseline tax policy to a simulation tax policy. The comparative statics model does not attempt to model economic and budgetary transitional impacts. It essentially estimates what the economy would look like today if an alternative tax policy had always been in place.

Estimates begin with the input of new tax parameters into the tax model, resulting in conventional estimates of revenue, the government deficit, government debt, and the distribution of the tax burden. At the same time, the tax model produces estimates of new marginal tax rates on labor and capital.

The marginal tax rates on labor and capital produced in the tax model are used to recalculate after-tax wages and the service price of capital in the production model. This then produces estimates of a new desired level of the capital stock, wages, hours worked, and capital income.

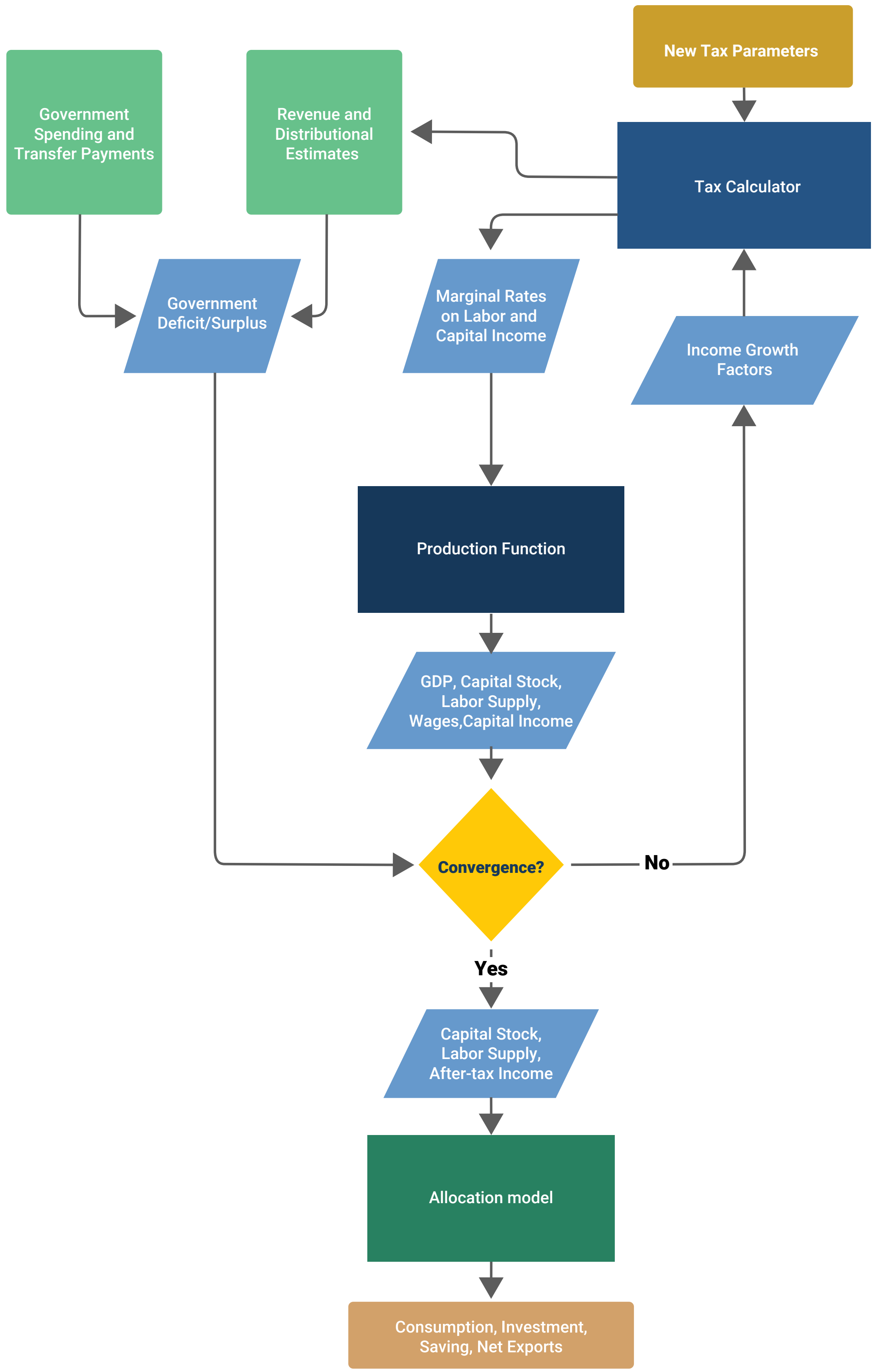
Under the classical comparative statics framework, the long-run simulation requires that the size of the capital stock adjusts to satisfy the baseline minimum required service price and after-tax return, assuming the US economy is fully open with elastic capital inflow. For example, a corporate tax rate reduction will increase the after-tax return on capital in the short run, causing the capital stock to expand as new investment will bring more capital accumulation and thereby reduce the rate of return on capital until it approaches its baseline level.

To account for the effect of real bracket creep, the phenomenon by which taxpayers fall into higher tax brackets due to higher incomes, the model calculates income growth factors. These income factors are used in the tax model to gross up or down incomes. With new incomes, we rerun the tax model and produce new estimates of the capital stock, wages, hours worked, and capital income. It also recalculates estimates of federal revenue, the government deficit, and the distribution of the tax burden given the new income level.

The model repeats this process of estimating output, marginal rates, and the tax burden until it hits a convergence in which incomes and marginal rates hit equilibrium. Convergence is defined as a point where two consecutive iterations yield near-zero changes in the growth factors. In practice, the model usually cycles about five times before it reaches an equilibrium. Once the tax and production model have converged, the production model has produced its final estimates of the long-run changes to the economy, federal revenue, and the tax burden.

Once the production model and the tax model have hit equilibrium, the estimated level of the capital stock, the budget deficit, and after-tax income are fed into the allocation model. This model uses those inputs to estimate consumption, investment, saving, net exports, and GNP.

Structure of the General Equilibrium Model



4.2 10-year Estimates

In addition to long-run estimates, the Tax Foundation model can create estimates of federal revenues, GDP, wages, investment, capital stock, employment, consumption, and other measures of economic output for each year over a 10-year period. The procedure for estimating policies over the 10-year budget window is like the procedure for comparative statics estimates. We compare baseline economic and tax parameters to simulation economic and tax parameters to estimate changes in economic output and tax revenue. However, rather than comparing baseline and simulation parameters for two periods (current year and simulation year), we compare baseline and simulation parameters for each year over the budget window. We also account for transitional revenue and economic impacts that would occur over a 10-year period.

Each year over the 10-year budget window starts with baseline estimates of marginal tax rates, federal revenue, and economic projections. We produce baseline marginal tax rates with the tax calculator for every year over the budget window. For baseline revenue and economic projections, we use the most up-to-date CBO Budget and Economic Outlook. The CBO outlook provides estimates of federal revenues by major source, projected federal debt, and GDP and its major components over the next 10 years. Our baseline projections conform to CBO's "current law" definition and include any temporary policies that are set to expire over the budget window.

For conventional revenue estimates, we reestimate tax liability for each year depending on the specifics of the tax proposal. For economic projections and dynamic estimates, we start by estimating changes in marginal tax rates for each year. We then use the comparative statics model to estimate the long-run impacts on the economy and assume an adjustment path for the capital stock consistent with recent empirical analysis. We assume that about 84 percent of the capital stock adjustment occurs by the 10th year and about 98 percent by the 20th year after a policy change.[22]

22 Gabriel Chodorow-Reich, Matthew Smith, Owen M. Zidar, and Eric Zwick, "Tax Policy and Investment in a Global Economy," NBER Working Paper 32180, https://www.nber.org/papers/w32180; Thomas Winberry, "Lumpy Investment, Business Cycles, and Stimulus Policy," *American Economic Review* 111:1 (January 2021): 364-396, https://www.aeaweb.org/articles?id=10.1257/aer.20161723.